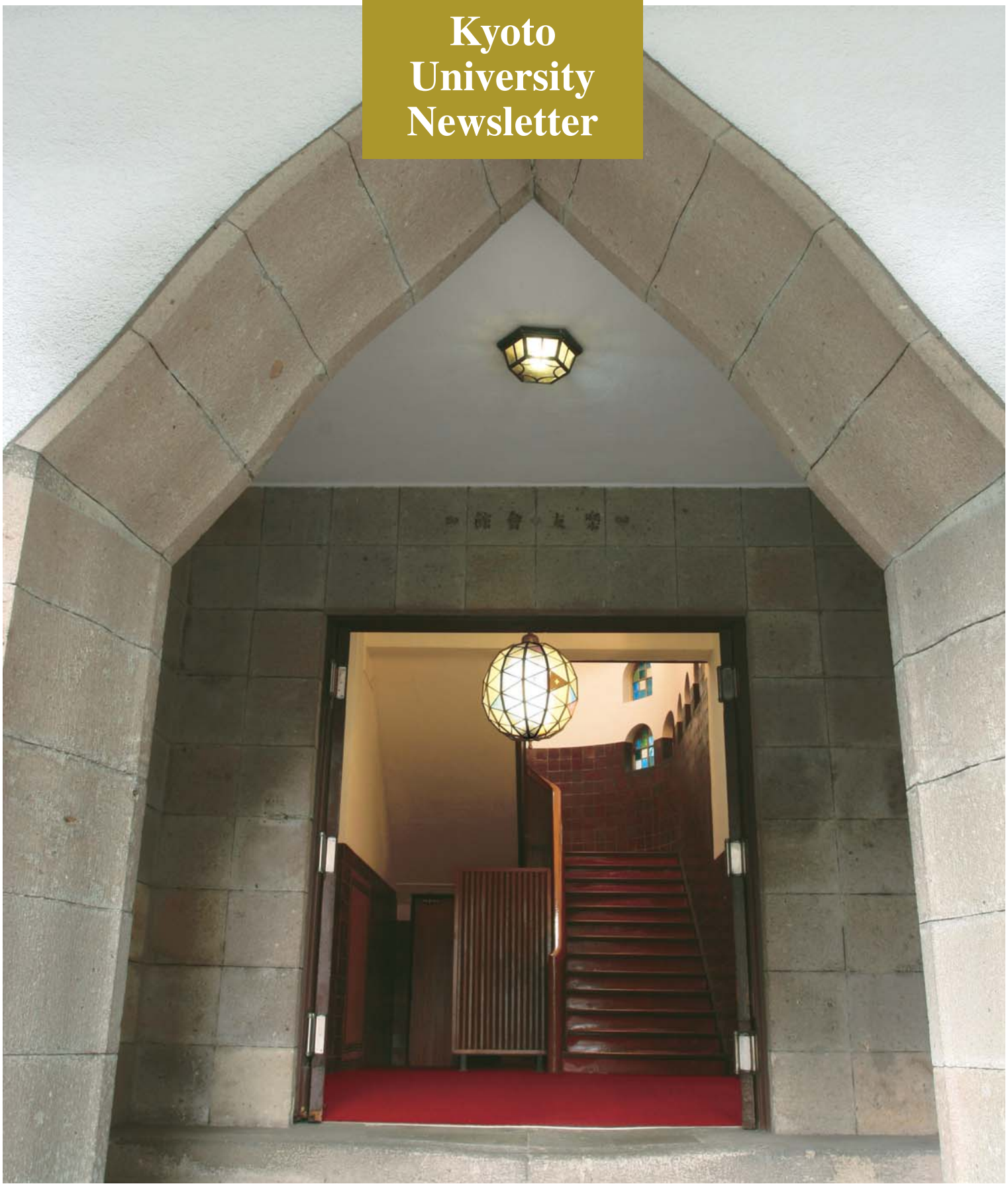
Greetings from Kyoto-U

楽友 Raku-Yu

Kyoto University Newsletter

SPRING 2008
Issue **13**



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Editor's Notes

"Travel is known to have a broadening effect, at least if the traveler is willing to keep his mind open. The amount of enlightenment which is gained from travel usually depends upon the amount of difference there is between the civilization from which the traveler starts his journey and that of the country at which he arrives. The more unlike the two are, the more opportunity there is for learning" (John Dewey, "Some Factors in Mutual National Understanding" [1921]).

With the extended and borderless network of global communication and the expansion of the global market, deep awareness of the ways that others are different from us is lost in the face of standardized and increasing amounts of information. It is our hope that this volume will create an occasion for mutual learning.

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A Note on Order of Names

As a general rule, names appearing in *Raku-Yu* are written in given name/family name order.

楽
Raku-Yu means to respect, treasure, and enjoy one's friendship.
友

This name was taken from the assembly hall called "*Raku-Yu Kaikan*" that commemorated the 25th anniversary of the founding of Kyoto University.

Front Picture:

Front Entrance of *"Raku-Yu Kaikan"* – Completed in 1925

"Raku-Yu Kaikan" was built as an alumni house to commemorate Kyoto University's 25th anniversary. It was frequently used for various purposes such as research conferences and lectures, and was the center of the academism of Kyoto University.

Hiroshi MATSUMOTO Born in 1942, he graduated from a master's course at the Graduate School of Engineering at Kyoto University in 1967 and earned an Engineering doctoral degree in 1973 from the university. He became an associate professor of the Faculty of Engineering at the university in 1974, and from the following year, worked as a visiting researcher at many institutions such as the NASA Ames Research Center and Stanford University. He became an associate professor at Kyoto University's Radio Atmospheric Science Center in 1981. He then became a professor in 1987 and the head of the center in 1992. After his experience as the head of the Research Institute for Sustainable Humanosphere, he assumed his present post in October 2005.

Executive Vice-President Matsumoto has been working hard to improve the working environment for researchers. In order to win competitive funds such as scientific research funding, he established an office to help researchers with such practical procedures as arranging applications and collecting information. These have been successful in bringing fruitful results. He has also been highly praised for establishing the Center for Women Researchers and Start-up Research Funds for Young Researchers earlier than any other institution. Among his achievements is the Intramural Loan Program, which provides the necessary funds required to maintain the level of most advanced research and which has been gaining attention as a unique program only found at Kyoto University. Furthermore, he recognizes the importance of such basic studies as Humanities and Social Sciences in maintaining the character and culture of the university, and has secured a new budget for these studies called "University Cooperative Expenses".

"Finance and research are not separate issues. I guess that I could make some improvements because I am in charge of both of them. President Oike made a wise decision, though it keeps me really busy," says Executive Vice-President Matsumoto, laughing. He seems ready to continue his commitment for the rest of his term.

What Could Highly Competitive Grants Bring-in for Kyoto University?

Kyoto University has experienced two major system changes since its foundation in 1897. In its one hundred and ten years history, these changes took place with an interval of about half a century. The first one was the reform from the imperial university to national university which took place in 1953. The second reform took place in 2004 based on legislation of "National University Corporations Law" in July, 2003. It aimed to transform national universities into ones with an independent administrative corporation style. Three and half years have past since the start of this new system. Kyoto University, like all other National University Corporations, gained full autonomy. That is, in addition to the academic freedom it has traditionally enjoyed, the university has the freedom and responsibility of self management.

Kyoto University will capitalize on this full institutional autonomy and academic freedom to pursue its missions as National University Corporation in the realms of education, research and social services (such as healthcare services provided by the university hospital). Though the Mission Statement of Kyoto University was settled before the second reform of the university system, it is continued to be succeeded and its importance has since reconfirmed after the reform. It declares that Kyoto University will sustain and develop its historical commitment to academic freedom and pursue harmonious coexistence within human and ecological community on this planet. In the context of research, it describes that Kyoto University will generate world-class knowledge through freedom and autonomy in research that conforms with high ethical standards. As a university that comprehends many graduate schools, faculties, research institutes and centers, Kyoto University will strive for diverse developments in pure and applied research in the humanities, sciences and technology, while seeking for the integration of these various perspectives. Concerning education, the Mission Statement declares that Kyoto University will educate outstanding and humane researchers and specialists, who will contribute responsibly to the world's human and ecological community. I strongly believe that education at research university such as Kyoto University can be and should be carried out in its full use of high level research activities. In other words, education through high-level and world-class research enables us to inspire our young students to become world leaders in their respective fields. Therefore, research programs which could bring in highly competitive grants will definitely provide a soul-touching inspiration for the young generation through their world-class research activities.

In the new system of National University Corporation, however, we are facing financial difficulties. The financial support from MEXT (Ministry of Education, Culture, Sports, Science and Technology) in the form of "University Grants" has decreased with an annual rate of 1% and will continue to decrease, at least during the current Mid-term settled by the government. Furthermore, the university hospital is required to reduce its cost with an annual rate of 2%, which is another big reduction of our income from MEXT. In order to overcome these difficulties, we have to implement a new system of financial administration. While trying to reduce the management cost, we have made efforts of not decreasing the budget for education and research which is distributed to component institutions such as graduate schools and research institutes. The collaborative research with business industries has increased and contributed to increasing the university income. To enhance the business-academia collaboration at Kyoto University, we have reformed the internal structure of promotion section for Industry-Government-Academia Collaboration in July, 2007, establishing the "I-G-A Collaborations". Moreover, the university promotes and provides supports to obtain competitive grants. The increase of income through competitive grants not only enhances the level of research in respective fields of the grant winners, but also enriches the university as a whole through strategic financial support programs based on the indirect income associated with the competitive grants. Certain percentages of the obtained grant will be allocated to the university so that it can be utilized to support the university's education and research activities as a whole. Up to date, Kyoto University has succeeded in obtaining sizable competitive grants which contribute to recovering its income level, compensating for the decrease of the University Grants.

The current issue of Raku-Yu features reports of recently granted programs in Kyoto University. All of them have been successfully granted through very tough screening processes and were selected among numerous qualified competitors from rival universities and research institutions. Two different categories of competitive grants have been inaugurated by MEXT from this year. One is the Global COE Program, while the other is the World Premier International Research Center (WPI) Program. The Global COE Program was established "to advance university reform, foster talented young researchers and elevate the standard of university research while pioneering new academic fields" (from the website of Japan Society for the Promotion of Science). The selection criteria were whether the proposal met program requirements and provided sufficient evidence that results would be globally recognized and enhance the university's international competitiveness. Six Kyoto University programs have been awarded Global COE atatus thanks to the efforts of the respective program team leaders and their colleagues. The main text of this issue introduces the titles and content of the programs. The World Premier International Research Center Program is inaugurated by MEXT in FY2007 based on "The 3rd Science and Technology Basic Plan" set by the cabinet as well as "Comprehensive Strategy for Creating Innovation" set by the Council for Science and Technology Policy. The qualification demanded by the selection committee is to create a top world-level research institute with the world's most leading researchers and an excellent research environment to carry out "globally visible" research activities. Among more than 20 applications from prestigious universities and research institutes, one project entitled "Institute for Integrated Cell-Material Sciences (iCeMS)" headed by Prof. Norio Nakatsuji of Kyoto University was selected and awarded. The iCeMS has already attracted World's attentions through a recent extraordinary achievement on iPS cells (induced Pluripotent Stem cells) by a WPI-iCeMS member, Prof. Shinya Yamanaka. Kyoto University will provide a full-fledge support to the WPI-iCeMS activities and iPS cell research. Details of the iCeMS research program are also described in this issue.

I hope you will enjoy this issue of Raku-Yu.

Hiroshi Matsumoto 松本 紘

Executive Vice-President of Kyoto University

Introduction of the World Premier International Research Center Initiative and the Global Center of Excellence Program

To raise Japan's scientific and technological levels and sharpen its competitive edge globally, in fiscal 2007 the Ministry of Education, Culture, Sports, Science and Technology (MEXT) and the Japan Society for the Promotion of Science launched the World Premier International Research Center (WPI) Initiative and Global Center of Excellence (COE) Program. Both programs accept applications from leading Japanese universities, graduate schools and research institutions and use third-party assessments to select the institutions to fund. The intent is to elevate the quality of research in Japan by spurring competitiveness in university and research institute environments.

World Premier International Research Center Initiative

For the purpose of raising the levels of science and technology in Japan and consistently further innovation, which drives future development, a quantum leap in the basic research that serves as springboard is needed if we are to realize a similar jump in international competitiveness. Thinking outside-the-box is necessary to mold top-level research centers that will attract the best minds in the world who will carry out important research as they create in our own country spaces for the cultivation of first-rate human resources.

In response to the Third Basic Program for Science and Technology, the Comprehensive Strategy for Creating Innovation, and other policies, MEXT in 2007 began the WPI Initiative, a program to establish research centers standing at the apex of global excellence. The initiative intends to create "globally visible" research entities with excellent environments and to promote first-rate research by drawing front-line researchers from around the world simply because they want to work there. This is done by intensively supporting projects to create outstanding international research centers staffed by leading researchers and encouraging autonomous endeavors for system reform.

The program received 33 applications from 22 institutions around Japan. The five applications (from five institutions) selected follow:

- Tohoku University: WPI Advanced Institute for Materials Research
- The University of Tokyo: Institute for the Physics and Mathematics of the Universe
- Kyoto University: Institute for Integrated Cell-Materials Sciences
- Osaka University: Osaka University Immunology Frontier Research Center
- National Institute for Materials Science (Independent Administrative Agency): International Center for Materials Nanoarchitectonics (MANA)

Global COE Program

The 21st Century COE Program established in 2002 strived to advance university reform, foster talented young researchers, pioneer new academic fields, and elevate the standard of university research. Faced with advancing "info-proliferation" and continued globalization, this initiative must educate researchers to meet ever rising international standards. The September 2005 Central Education Council Report "Graduate School Education in the New Age" and the Basic Plan for Science and Technology approved by the Cabinet in March 2006 both called for a more stringent and advanced post-"21st Century COE program."

MEXT launched the Global COE Program in 2007 as a new project targeting all scientific fields, including interdisciplinary and combined fields and new disciplines, in order to better educate young researchers who can act on the international stage, particularly in industry, and to sharpen the competitive edge of Japan's education and research centers.

The Global COE Program aims to raise the level of education and research in Japan's graduate schools. To cultivate creative human resources capable of leading the world in the highest caliber research centers, the program will prioritize and support the creation of world-class education and research centers, thereby making Japanese universities more globally competitive.

In 2007, the program received 281 applications from 111 public and private universities and colleges. Sixty-three applications from 28 schools were selected. Kyoto University submitted 12, of which 6 were accepted. Thus, half of our applications were accepted, as compared to only 22.4% nationwide.

Institute for Integrated Cell-Material Sciences (iCeMS)

A project to create a model for premier global research centers in Japan

1. Overview

Our new institute, iCeMS, aims to become a premier global research institute that creates interdisciplinary fields while inserting itself into the global flow of young scientists developing their careers. Leading scientists will gather in Kyoto and collaborate on the synergistic integration of cell and material sciences, namely cell biology, chemistry and physics. Based on the principal that fundamental understanding and control of molecular complexes in the meso-scale of 5-100 nm is critical for creating next-generation science and technology, the iCeMS will focus on pluripotent stem (ES and iPS) cells and meso-control.

We will take cross-disciplinary approaches to create the following new science fields and applications stemming from them: 1) new chemistry and physics of meso-space, 2) cellular meso-biophysics, and 3) stem-cell control by meso-engineering.

We will further contribute to human wellness by developing A) environmentally-friendly chemistry through meso-control, B) detoxication and drug synthesis in the body, and C) regenerative medicine—using smart materials to control stem cells.

Central to our intention to make the iCeMS a model for world-class research centers in Japan is our novel management system and the following initiatives.

1) Kyoto iCeMS Fellows (independent "super postdocs"): International advertising and searching will turn our institute into a global career hub for the best and brightest young researchers.
2) Common-use laboratories and open offices will remove the physical and mental walls between research groups and enable flexible allocation of research spaces, thus promoting cross-disciplinary research among researchers from different fields.
3) The institute will provide special support for nurturing female researchers and preparing them for top-level positions in the sciences.

2. Purpose and Mission of the iCeMS

The iCeMS project is our response to the Japanese government's initiative to found premier international research centers that will (1) explore interdisciplinary research fields, and (2) insert themselves into the global career-development flow of the most distinguished scientists of their generations.

To address the first requirement, the exploration of interdisciplinary fields, our institute aims to gather a critical mass of leading scientists for the creation of a new research field: "integrated cell-material sciences." The fundamental understanding and control of molecular complexes in the meso-space of 5-100 nm is considered critical for creating the science and technology of the next generation.

Therefore, meso-space is one of two key concepts in this project. Meso-space is greater than nano-space, which has been extensively explored by nano-technology and molecular biology. It is smaller than bulk space, which is greater than one micron and has sufficient numbers of molecules for ensemble averaging. Between these two well-traveled lands lies the vast unexplored territory of meso-space: 5-100 nm. Although molecular, atomic, and ionic interactions occurring in nano-space are interesting research subjects, they are generally elementary processes. Non-linear, weakly-cooperative events, which present challenging problems and may seed tomorrow's technologies, take place in meso-space.

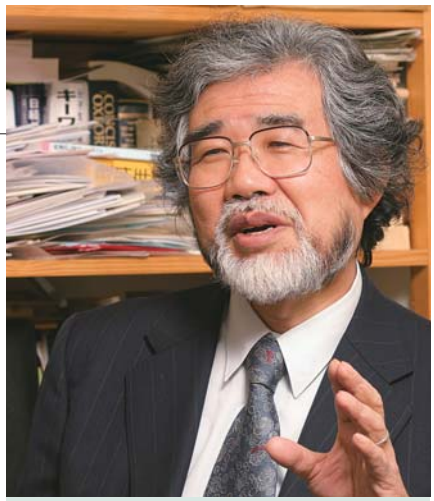
Using the notion of meso-space, biological and non-biological worlds can cross-fertilize to learn from each other and elucidate the physical and chemical processes characteristic of meso-space, including the formation and functional mechanisms of meso-scale molecular complexes in the cell. We believe that such study will develop a new realm of science and technology within the cross-disciplinary nexus of biosciences, physics, chemistry, and materials science.

The second key concept involves stem cells. Since our group of investigators will represent diverse backgrounds, we must establish a standard paradigm for studying the cell. Facilitating the sharing of knowledge on cells, biological tools, samples, and communication among researchers in different fields is indispensable for fostering collaborative research. For this purpose, all the principal investigators will use pluripotent stem cells, either embryonic or artificially induced. The genes of these rapidly growing cells are easily manipulated and can be differentiated into various cell lineages. Therefore, using pluripotent stem cells for research will accelerate the development of regenerative treatments.

To address the requirement for the applying institution to place itself within the global career-development flow of young scientists, I affirm my abiding faith in Japanese science. The most critical problem that Japanese science facing today is its exclusion from the global flow of young scientists developing their careers. Unless we attract the best and brightest young researchers to Japan and induce some of them to stay, Japanese science will lag behind that of other developed countries. The first sentence of the call for applications extended by the Program Committee of the World Premier International Research Center (WPI) Initiative states, "We will need to position ourselves within the global flow of outstanding human resources while creating research platforms that will naturally attract and amass such human resources in Japan."

3. Administration Programs and Goals

We will run the institute as a model for future research centers at Kyoto University and around Japan. Occupying a special position within the organizational



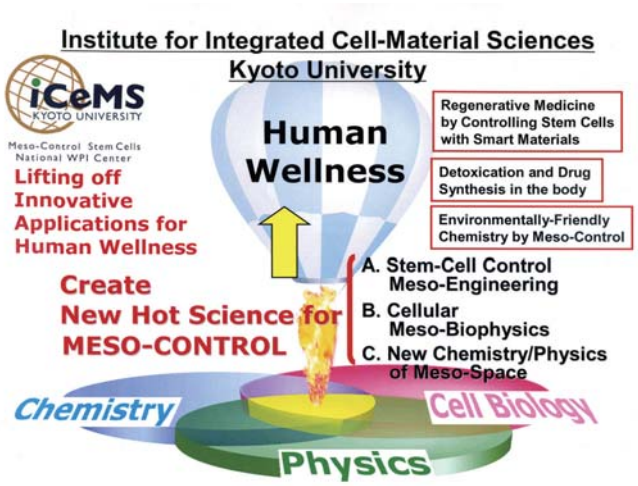
Director:
Prof. Norio NAKATSUJI

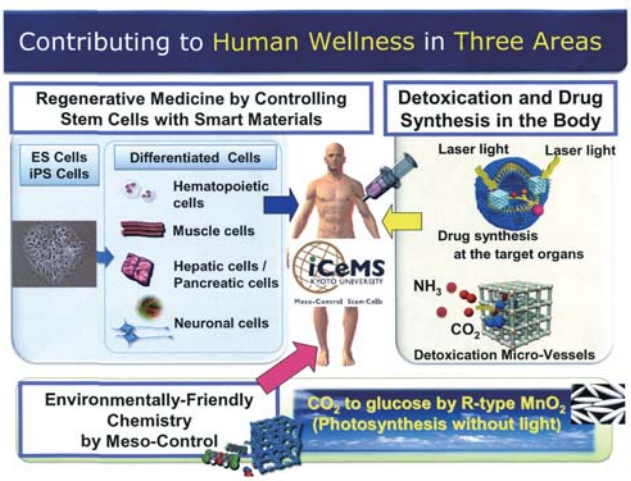
structure of Kyoto University, it will introduce flexible management rules and exercise freedom from many constraints binding typical Japanese universities. Although the director will report directly to the president of Kyoto University, the institute is assured of autonomy and the director is authorized to make decisions on overall operation.

The following are examples of our novel administration policy. 1) The official language will be English. 2) The director will make decisions swiftly, major ones with the aid of the institute's executive board. 3) The salary system will be merit based. 4) Open positions for scientists will be announced and advertised internationally. 5) Start-up funds for researchers arriving from other institutions will be provided.

We will also create special programs for the iCeMS. Given Japan's geo-graphical, linguistic, and cultural barriers, even leading institutions carrying out cutting-edge research have difficulty attracting scientists from abroad. To improve this situation, the Institute will additionally implement the following programs and strategies.

1) Kyoto iCeMS Fellow Award (a career-development "super postdoc" system): We have created a career-development "super postdoc" system called the "Kyoto iCeMS Fellow" program to provide significant resources and autonomy to talented young researchers for their scientific development. Candidates will be selected from the international pool of top-class scientists who have recently acquired doctoral degrees. Successful applicants will be awarded five years of salary along with funds to run small, independent research groups. As these young scientists eventually move on to the next phase of their promising international careers, the institute's role and reputation as a prominent global scientific center will be widely acknowledged.
2) Common-use laboratories and open offices: Physical distance between research groups will be reduced to encourage interaction and collaboration on a daily basis, which will eventually contribute to major scientific breakthroughs. To enhance communication among researchers, the iCeMS will provide common-use laboratories with bench space allocated to all research groups, including those led by Kyoto iCeMS fellows. The space assigned to each principal investigator will be merit based, an arrangement facilitated by flexible allocation of the common-use laboratories.
3) Scientific integrity and science communication program: Although science and technology have greatly contributed to the advancement of human health and welfare, we are also aware of society's concerns for what scientists wish to achieve in the future and what they intend to do with it. Some of these concerns may be groundless, provoked by the words and deeds of scientists who lack scientific integrity. Others may stem from insufficient communication by scientists, who need to rise to the challenge to provide informed lay individuals with adequate and balanced information about science and technology. We will initiate a program to educate scientists on scientific integrity and ways to communicate better with society at large.





Formation of a Strategic Base for Biodiversity and Evolutionary Research: From Genome To Ecosystem

While in the 20th century researchers tried to discover *the general basic principles of organisms*, in the early 21st century researchers are striving to understand the evolution and diversity of organisms on the basis of said principles by integrating morphology, physiology, ecology, and other disciplines.

The chief difficulty in studying the evolution and diversity of organisms lies in the need to consider factors ranging from the tiny genome to the entire ecosystem. As dealing with multiple factors can create a loss of focus, researchers have typically narrowed their sights to one level or factor at a time. Unfortunately, the research and education system that developed in response to this compartmentalized approach is inadequate for incisively studying the evolution and diversity of organisms.

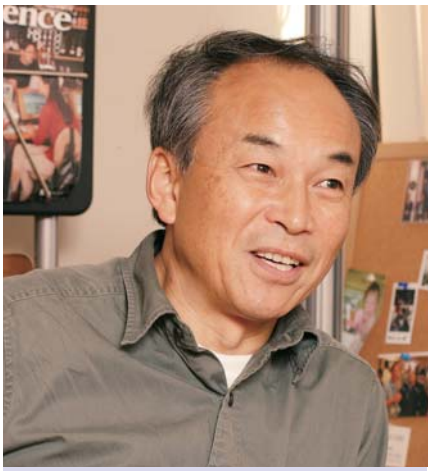
To solve these problems, Kyoto University's Department of Zoology, Department of Botany, Department of Biophysics, Primate Research Institute, and Center for Ecological Research of the Graduate School of Science organized a 21st Century COE program team that strongly emphasized exchanges of studies and integration of the education programs between micro-level biology (genomic science, evolutionary developmental biology, genetic science, cell biology, neurobiology, molecular physiology, and molecular evolutionary study) and macro-level biology (primatology, anthropology, ethology, environmental biology, evolutionary taxonomy, and so on). We promoted exchanges of studies at various levels, including inter-laboratory seminar programs. We have succeeded in initiating pioneering studies of biodiversity.

To build on the progress of the current 21st Century COE Program, we are planning the following projects as our Global COE.

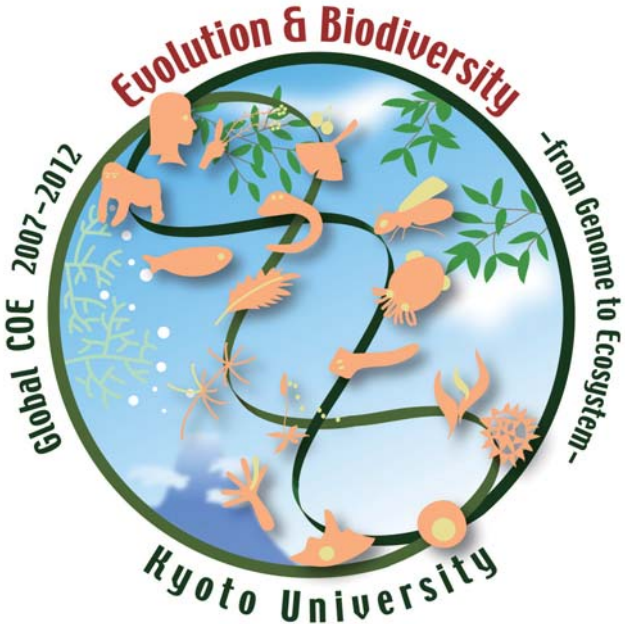
1. Making breakthroughs in the study of evolution and the diversity of life, and establishing an international base of research of evolution and biodiversity
2. Establishing a new educational program and training a new generation of researchers capable of such breakthroughs
3. Promoting the systematization of biological knowledge

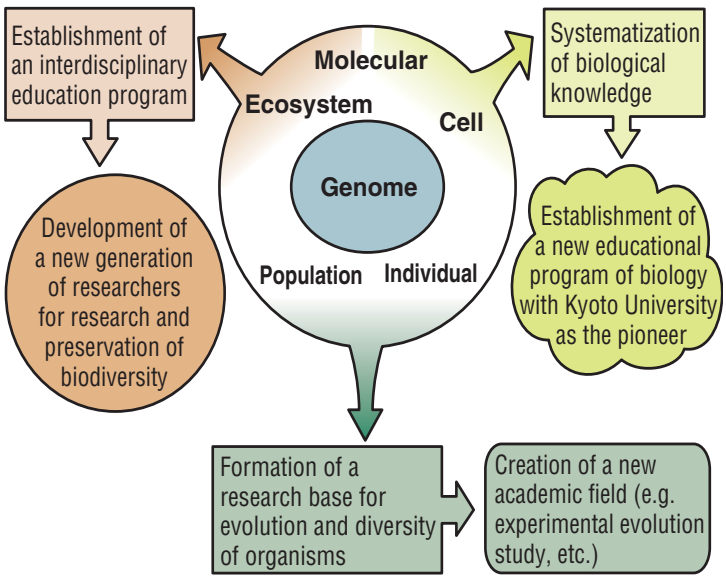
We are also planning to enhance education programs for biodiversity study. With the advent of the "genome century," a new curriculum to be organized for biology students will teach competence in the manipulation of genome data. Laboratories for genome education are in the planning phase. We are renovating the Botanical Garden located in Kyoto University's northern campus into a research education facility for a program uniting genome science and field science.

These activities will help us construct an international base for experimental evolutionary biology that will blaze a trail globally.



Program Leader:
Prof. Kiyokazu AGATA





"INTEGRATED MATERIALS SCIENCE": A New Paradigm in Chemistry and Materials Science for a New Breed of Researchers

This article introduces the "International Center for Integrated Research and Advanced Education in Materials Science," a Global COE project for fiscal 2007-2011 granted in the area "Chemistry and Materials Science".

The project is intended to consolidate the more than 100 chemistry-related Kyoto University research groups in the Graduate School of Engineering, the Graduate School of Science, and the Institute for Chemical Research and thereby to blend virtually all aspects of chemistry, from basic to engineering and from molecules to materials, to create a new paradigm "integrated materials science."

Concept and Objectives

In contemporary science and particularly in chemistry, a trend is now obvious: an accelerated merging of disciplines (inorganic, organic, etc.), which in part stems from the recognition that traditionally trained experts, however excellent in a specific field they might be, can no longer cope with complex multifaceted problems such as sustainable growth and global warming.

The recognition, in turn, demands a new framework for research and education, which we coin as ***"integrated materials science"*** (Figure), to achieve the following:

(a)**"Integrated Materials Science"—A New Paradigm:** An effective integration of basic chemistry and materials science in research and advanced education, *beyond classical disciplines, faculties, and international borders*.

(b)**A New Breed of Scientist:** Cultivation of the next generation of internationally competent, creative, and independent scientists with expertise in multidisciplinary fields whose visions are open to society.

(c)**"Interactive Materials Science"—Science for Society:** Creation of a renewed materials science, *interactive and globally open*, that contributes to solving critical problems such as sustainability as well as to culture.

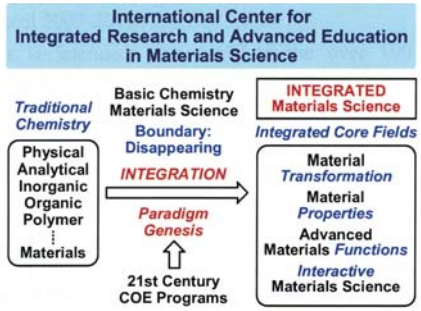


Figure. ***Integrated Materials Science***: A new paradigm in chemistry and materials science.

Project Programs

To achieve (a)–(c) above, this project plans the following two programs:

(1) *Program in Research*: International Center for Integrated Materials Science

Integrated Core Fields: Integration *beyond* Disciplines. The first step is to create an "integrated materials science"; namely, to comprehensively integrate basic chemistry and materials science in Kyoto. Four ***integrated core fields*** will be organized (see Figure):

Material Transformation
Material Properties
Advanced Material Functions
Interactive Materials Science

Inter-Field Joint Research Projects: Integration *beyond* Core Fields. Joint projects among the integrated core fields will be organized to strengthen collaboration among members selected *beyond faculty and traditional boundary*.

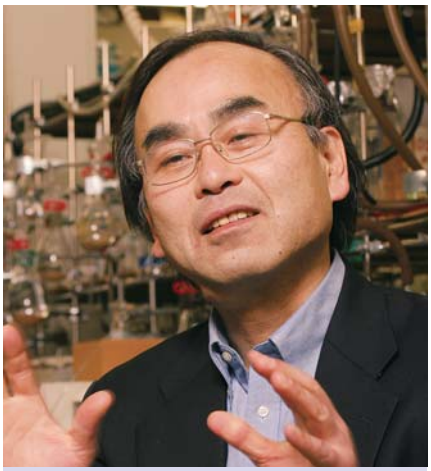
Interactive Materials Science: Integration *beyond* Academia. Another feature of this project is to create a new materials science that is open to, interacts with, and contributes to the global society *beyond academia*.

International "Brain Influx" Epicenter: Integration *beyond* Borders. Programs will be implemented to establish an international *epicenter* of chemistry and materials science to attract the "best minds." These will include *international exchange programs* to send junior COE members to key overseas institutions and the *Integrated Materials Science International Scholarship* for bringing leading scientists to Kyoto for joint research, faculty training, and advanced education.

(2) *Program in Education*: A New Breed of Internationally Competent Young Scientists

Within the scope of "integrated materials science", the following programs will be organized to cultivate independent minds and international competence in junior COE faculty members and students:

Interfaculty Integrated Course Program. New integrated educational programs will be organized *beyond faculties and specialties*.



Program Leader:
Prof. Mitsuo SAWAMOTO

Interdisciplinary On-Site Research and Training. Advanced education and interdisciplinary training will be provided through the exchange of students and assistant professors within the core fields to perform *on-site* cutting-edge research within the COE Project.

Support Programs. International competence and independent research abilities will be cultivated in junior COE members and students through *Embryonic Research Project Support, International Academic Exchange Program*, and *International Workshop Initiative* (which provides financial support and advice to young scientists for planning international meetings sorely by themselves).

The Future

Chemistry is the *only* fundamental science that *creates* novel molecules and materials via infinite permutation of atoms and reactions. Through interdisciplinary collaboration with physics and biology, chemistry and materials science today are expected to make fundamental contributions to science and the global community. Members of the COE Project are determined to develop the new paradigm of "*integrated materials science*" and to cultivate competent, creative, and energetic young scientists who will *take off* from Kyoto University to international arenas in science and beyond.

Informatics Education and Research for a Knowledge-Circulating Society

In FY 2007, we started a five-year MEXT Global COE program entitled the *Informatics Education and Research Center for a Knowledge-Circulating Society.*

We aim to create an international education and research center that educates Ph.D. students and young researchers in computer science and information technology through advanced research. The program is jointly conducted by the Graduate School of Informatics (departments of Social Informatics, Intelligence Science & Technology, Applied Mathematics & Physics, Systems Science, Communications & Computer Engineering) and the Academic Center for Computing and Media Studies.

The program succeeds our 21st Century COE Program (*Informatics Center for the Development of Knowledge Society Infrastructure*), which was noted for its outstanding achievements (see Figure 1).

Information systems as social infrastructures have improved as information technologies develop. However, numerous technological and social problems are surfacing: unfamiliar human-computer interfaces, the threat of unpredictable behavior based on unreliable knowledge acquired from the Internet, and the fragility of social information systems. These problems can be ascribed to the congestion of knowledge circulated among people, communities, and societies. In order to cope with these problems, we established four research & education cores under the global COE program (see Figure 2).

The primordial knowledge model core (Prof. Toyoaki Nishida) focuses on the fundamental mechanisms underlying knowledge in co-action. In order to develop better human interfaces for knowledge communication, it integrates multi-modal, brain and biological measurements to uncover how knowledge and communication induce each other.

The knowledge search core (Prof. Katsumi Tanaka) focuses on new technologies to enable searching for reliable knowledge through a variety of sources, and on social systems and business models related to searching.

The field informatics core (Prof. Toru Ishida) focuses on methodology for constructing social information systems based on collaboration with field experts.

The knowledge grid computing core (Prof. Yoshimasa Nakamura) focuses on the construction of reliable high-speed knowledge-service infrastructures to support the previous three cores.

Cooperation among the four cores will create a center that offers international education on a par with outstanding global institutions and conducts research on "information technology to promote the circulation of knowledge."

We are preparing the following education programs:

- Young leader cultivation program (research grant of 1-1.5 million yen awarded to each applicant accepted, 16 total)
- Strategic communication skill seminars (English & Japanese language)
- Multi-adviser system for Ph.D. students
- Establishment of international GCOE hubs
- Financial support for Ph.D. students (220,000 yen to be awarded to each of eight foreign students accepted)
- Interdisciplinary seminars

Program Leader:
Prof. Katsumi TANAKA

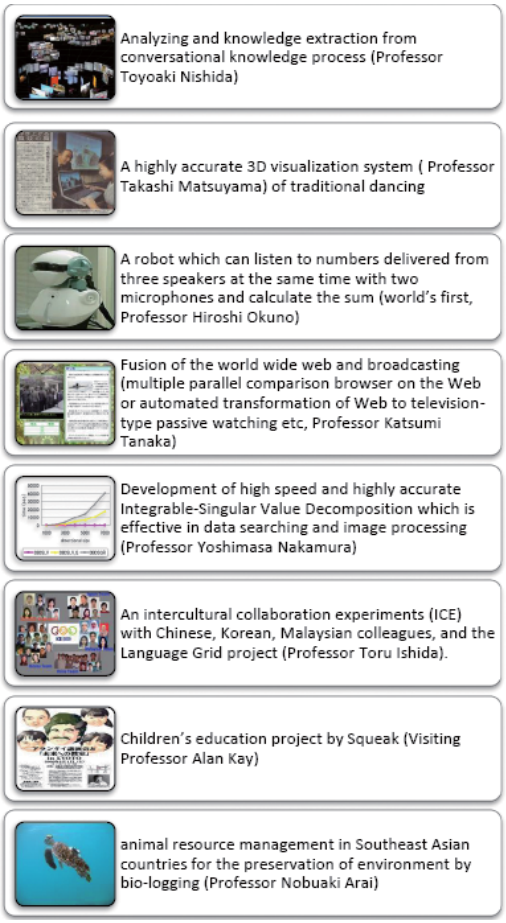


Figure1. Achievements of the 21st COE program

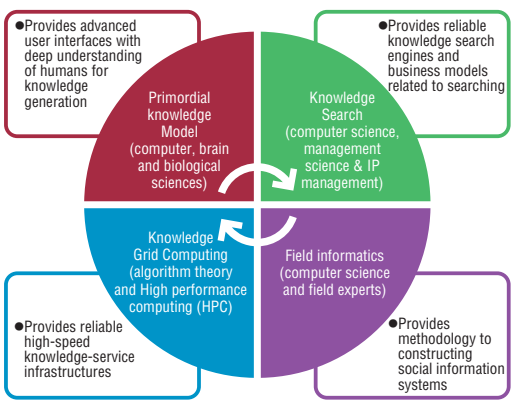


Figure2. Four cores of the global COE program

COE for Education and Research on "Photonics and Electronics Science and Engineering"

In establishing the COE for *photonics and electronics science and engineering* to investigate and develop innovative technologies that will achieve an arbitrary manipulation of photons (light) and an ultimate control of electrons, this program exemplifies our motto: *"Challenge the limitations of current technology and create new functionalities."*

In the 20th century, technologies for information processing (including communication, recording, and sensing) and energy processing (including control, conversion, and lighting) were highly instrumental in enriching human activity. In the 21st century, existing technologies will be unable to accommodate increasingly rapid changes in the amount of information processed and energy consumed. Therefore, we must develop *innovative technologies*—including structures, operation principles, circuit designs and algorithms—to break through the limitations imposed by conventional concepts of materials and devices.

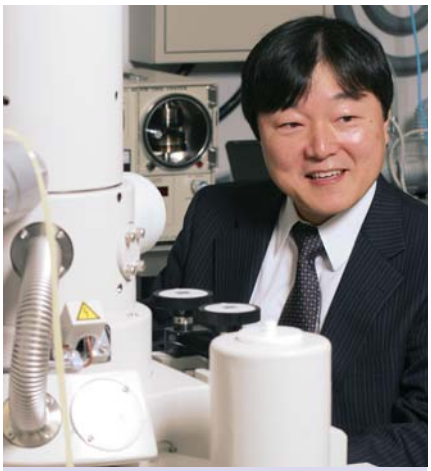
During the earlier 21st century COE program funded by MEXT (Ministry of Education, Culture, Sports and Technology) from October 2002 to March 2007, the evaluation board highly rated our education and research activities in the field of *photonics and electronics*. The board ranked our research on photonic crystals, wide band-gap electronics, and LSI designs with the best in the world. By extending and deepening this world-class instruction and research, the proposed program aims to establish the next COE, *photonics and electronics science and engineering*, in line with our motto: *"Challenge the limitations of current technology and create new functionalities."* The pertinent ideas underpinning realization of the *innovative technologies* of this COE can be summarized in the following questions:

"Can we make a chip to stop (or store) light?"
"Can we make (nano)lasers based on silicon?"
"Can we go beyond the diffraction limit of imaging/focusing?"
"Can we realize all solid-state lighting?"
"Can we create nm-scale LSIs designs that can tolerate inevitable atomic level fluctuations?"
"Can we make ultra-low-loss power electronics devices that can reduce energy consumption dramatically?"
"Can we make electronic devices that can operate even at 500°C?"

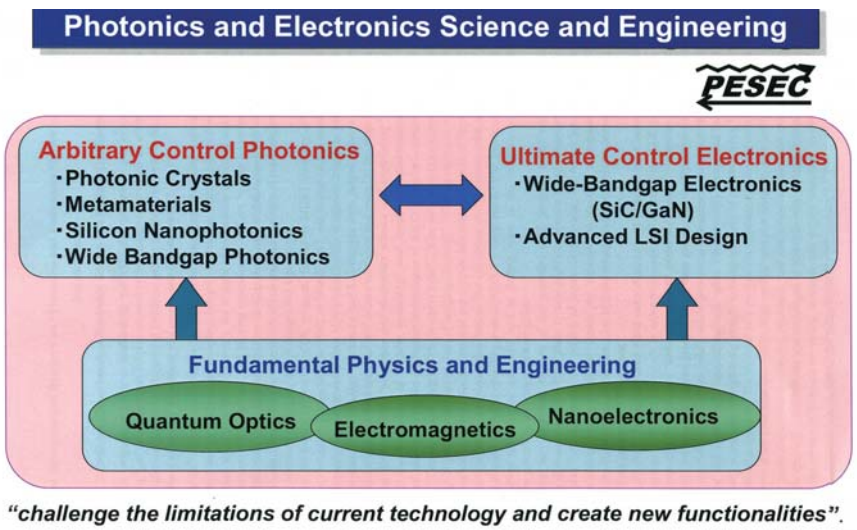
These challenges highlight the limitations of current technologies and will lead toward solutions for dealing with rapidly increasing information processing and energy consumption.

Another critical mission of the proposed COE program is the education of the next generation of researchers. The COE plans to train highly competent young researchers destined for both academia and industry in Japan and overseas. Self-reliant, internationally minded young researchers with strong leadership skills will be needed to develop next-generation technologies. Therefore, enhanced education for these young researchers will be a key mission of the proposed COE program.

In April 2007, the *Photonics and Electronics Science and Engineering Center (PESEC)* was established at Kyoto University to serve as platform of the COE program. This center includes three research groups: the *Arbitrary Control Photonics Group*, the *Ultimate Control Electronics Group*, and the *Fundamental Physics Group*. Close collaboration will position these groups to stimulate each other, heighten research levels, and promote international collaborations. We have built strong connections with internationally recognized research groups around the world. This program aims not only to strengthen existing collaborative networks, but construct new international networks. The *PESEC* will provide opportunities for collaborative researchers worldwide to share profound knowledge, high quality research facilities, and new, highly functional materials/devices in photonics and electronics science and engineering. This will facilitate research collaborations and scientist exchanges with partners all over the world. The exchange program for young scientists will particularly contribute to the fostering of future world-class scientists as well as the further development of this research field.



Program Leader:
Prof. Susumu NODA



"challenge the limitations of current technology and create new functionalities".

In Search of a Sustainable Humanosphere in Asia and Africa

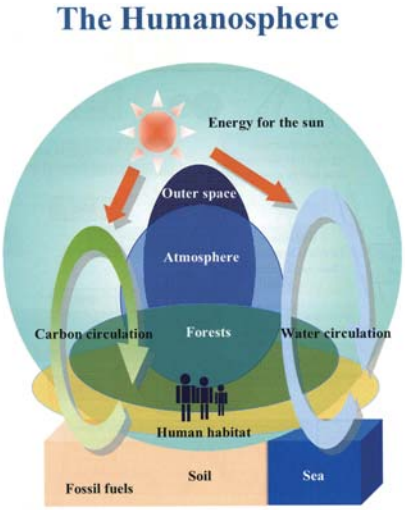
A major innovation of our program lies in its extraordinary combination of diverse disciplines. It is primarily a research and training program for area study specialists engaging in the fieldwork of local societies in Asia and Africa, in search of their long-term sustainability. In the light of growing awareness of the significance of ecological security, climate change and energy security, as well as their relevance to the poverty alleviation and welfare of local society, we have invited scientists working on the development of frontier technology to work with us, in order to broaden our perspective and understand the role that tropical Asian and African societies could play in the global context. We study various aspects of "humanosphere" (the living environment) from humanities, social sciences and area study perspectives, in combination with the latest knowledge on the "biosphere" and the "geosphere", provided by scientists, which underpin its sustainability.

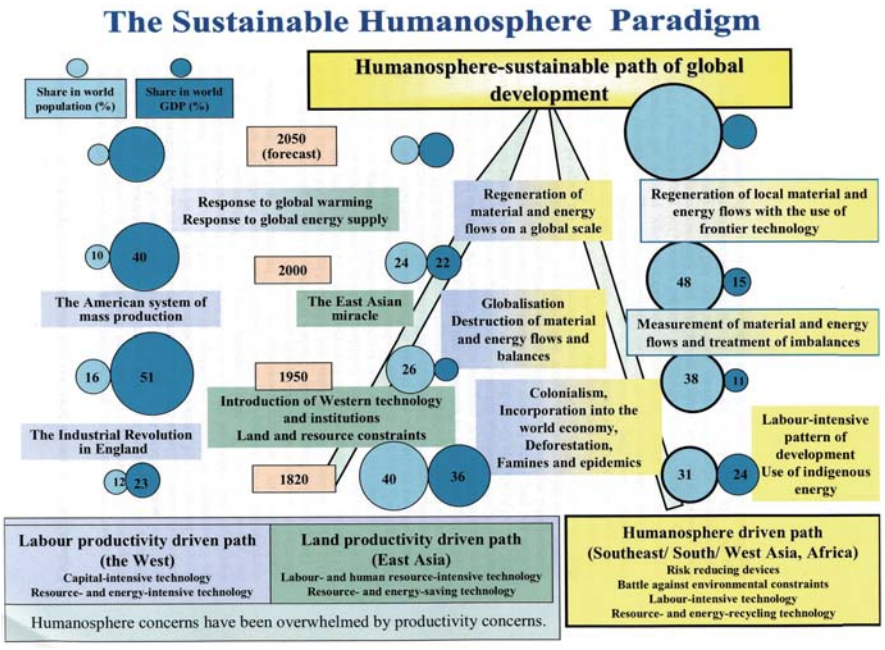
The Center for Southeast Asian Studies (CSEAS) acts as the organizer institution. In 2002, the Graduate School of Asian and African Area Studies (ASAFAS) launched a 21st Century COE program, in collaboration with CSEAS, with the title "Aiming for COE of Integrated Area Studies: Establishing Field Stations in Asia and Africa, and Integrating Research Activities and On-Site-Education". By setting up a number of field stations, this program enabled students and researchers to work with local people and researchers on the spot and engage in fieldwork on a long-term basis. As a result, many doctoral theses have been successfully completed, and some outstanding research monographs have been published. The program ended in March 2007.

Inheriting the system of education and training founded by the 21st Century COE program, this Global COE program aims to deepen the inter-disciplinary focus in area studies at Kyoto University, not only by mobilizing resources of area study institutions, CSEAS, ASAFAS, the Center for Integrated Area Studies, the Center for African Area Studies and part of the Institute of Research in Humanities, but by collaborating with science-based institutes and schools. We work with specialists in wood and material science, atmospheric science, space technology and information technology at the Research Institute of Sustainable Humanosphere, to extend the scope of our scientific investigation. We have also asked for the participation of the Institute of Sustainable Science, as well as the Graduate School of Agriculture and the Graduate School of Engineering, to strengthen our coverage in research and education.

By bringing the knowledge of frontier science and technology into contact with the conventional area study disciplines of agronomy, ecology, politics and economics, sociology and anthropology, history, and medical science, this program aims to train a new generation of area study specialists and scientists equipped with a more comprehensive range of humanities, social science and science disciplines than hitherto possible. The outcome of this research will be disseminated through publications in English and in Japanese, and in some critical cases in several other Asian languages.

Program Leader:
Prof. Kaoru SUGIHARA





Revitalizing Education for Dynamic Hearts and Minds

Our Center conducts research on *revitalizing education for dynamic hearts and minds* through the academic disciplines of *psychology* and *educational studies*. Our diverse concentrations include philosophy and history in education, cognitive studies, neuropsychology, comparative psychology, developmental psychology, clinical psychology, lifelong learning, media studies, and cultural studies. Our researchers in psychology and educational studies come from the Graduate School of Education (Departments of Education and Clinical Studies of Education), the Institute for the Promotion of Excellence in Higher Education (Section I), the Graduate School of Letters (Department of Psychology), the Graduate School of Human and Environmental Studies (Department of Human Coexistence), and *Kokoro* Research Center.

Our Center takes three approaches to seeking knowledge: *empirical studies* that analyze problems, *clinical studies* that deepen understanding of problems, and *practical studies* that carry out solutions to problems. The four research units are: (A) *Basic Processes Unit*, which conducts research on both vital and non-vital states of mind; (B) *Systems Unit*, which conducts research into the design of systems necessary for revitalizing education for dynamic hearts and minds, as well as methods of explaining and applying these to society; (C) *Support Unit*, which researches the kinds of psychological support and educational commitments that are effective in revitalizing education for dynamic hearts and minds and puts these into practice; and (D) *Development and Evaluation Unit*, which evaluates the theories and practices proposed by each unit, and is implementing a project called "Cross-Cultural Research on the Sense of Happiness."

The Center aims to develop prominent, incisive, broadminded researchers in psychology and educational studies capable of publishing in acclaimed international academic journals and presenting papers at international conferences and meetings. To accomplish this, we are developing an educational system that will enable the Center to offer graduate education programs in psychology and educational studies. The Center will also reinforce its position as an international nexus for research and education through official academic exchange agreements with highly regarded research institutions abroad, including Michigan University, Lancaster University, the China National Institute for Educational Research, Beijing Normal University, the Free University of Berlin, and the Institute of Education at London University. The aim is to create in Kyoto University a meeting place for scholars in psychology and educational studies from all over the world.

Program Leader:
Prof. Masuo KOYASU

We hope that this integration will (a) achieve significant developments in the humanities discipline within Kyoto University and in academia as a whole; (b) promote scholarly information and understanding, which in turn will promote social reform and innovation; and (c) facilitate wider engagement in effective and fruitful educational practice.

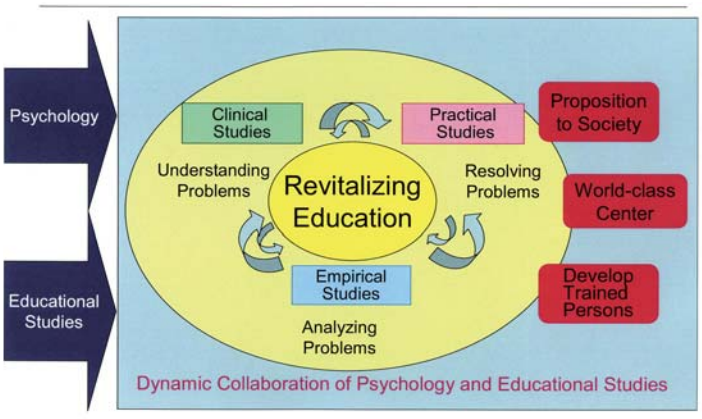


Figure 1. Main Academic Disciplines Covered by the Center

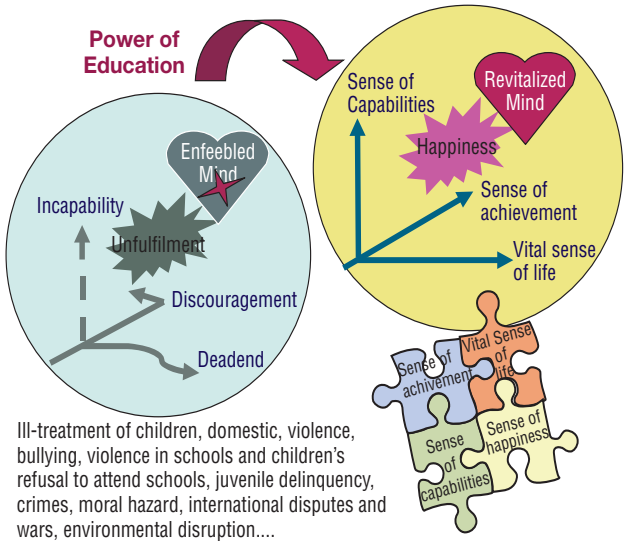


Figure 2. A Schematic Representation

Features 3

Prof. Shinya Yamanaka Succeeds in Generation of Human Induced Pluripotent Stem Cells (iPS cells)

A research group led by Prof. Shinya Yamanaka (Institute for Integrated Cell-Material Sciences/Institute for Frontier Medical Sciences) succeeded in generating induced pluripotent stem (iPS) cells, which are similar to embryonic system (ES) cells in terms of morphology, proliferation capacity, gene expression and differentiation capacity, from human skin cells. Being able to be generated from the skin cells of each patient, human iPS cells are expected to be used for cell transplantation therapy for many illnesses such as spinal cord injuries and juvenile diabetes. Moreover, using cardiac myocyte cells and hepatic cells differentiated from human iPS cells is believed to contribute greatly to the development of effective, safe medications.

In August 2006, Prof. Yamanaka's research group successfully generated iPS cells with a high proliferation capacity and pluripotency to differentiate into various kinds of cells, by transduction of four combined factors into mouse somatic cells. They also generated improved mouse iPS cells of the second generation in May 2007, which were verified to differentiate into various mouse somatic cells with no abnormal features when returned to fertilized eggs.

This time, they succeeded in generating human iPS cells, which had a similar morphology, proliferation capacity, gene expression, and differentiation capacity to that of human ES cells, by transduction of the same four factors defined in the mouse case into fibroblasts derived from adult human skin. An article on this research was published online on November 20 2007, on the website of the American science journal *Cell*.

They also successfully generated iPS cells by transduction of three factors out of the four, excluding Myc oncogene, into adult human and mouse skin cells, and published an article in the British science journal *Nature Biotechnology* on November 30 2007.

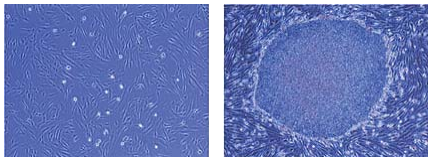
Prof. Yamanaka introducing his findings at the press conference in Kyoto University (November 2007)

Features 4

Establishment and Development of HAKU, the Kyoto University Alumni Association of Indonesia

The first meeting of the Kyoto University Alumni Association of Indonesia was held at the Jakarta Office of Center for Southeast Asian Studies, Kyoto University on July 29 2007. It was decided that the association would be called HAKU, which stands for its Indonesian name, *Himpunan Alumni Kyoto University*. It also refers to the Japanese word *haku*, as in *haku-shiki* or *haku-gaku*, meaning polymathy and erudition respectively. The President Kazuo Oike of Kyoto University gave a congratulatory address in front of an enthusiastic audience of approximately 60 people. Prof. Supiandi Sabiham of Bogor Agricultural University and Prof. Bambang Subiyanto of the Indonesian Institute of Sciences (LIPI) were appointed as the association's first president and vice president respectively. Other executive members were also chosen at the meeting, and it was decided that HAKU would participate in the First Kyoto University Southeast Asia Forum in November 2007.

On November 26 and 27, LIPI, HAKU, and the Global COE Program "In Search of a Sustainable Humanosphere in Asia and Africa" (organized by the Center for Southeast Asian Studies) jointly hosted a forum with the theme, "In Search of New Paradigm on Sustainable Humanosphere". In spite of the relatively expensive registration fee of 100,000 rupiah, approximately 140 people participated on the first day and had heated discussions after an opening speech by Vice-President Masato Kitani. In the evening, HAKU members had a general meeting and decided on the association's rules. They also made a decision to have meetings for executive members in the middle of every year, and meetings and seminars for all members at the end of every year. HAKU is organizing itself slowly but steadily, and it is sure to become an important Southeast Asian network hub for Kyoto University.



Fibroblast iPS cell

Figure 1. Human iPS cells
Human iPS cells adhere to each other to form a flat colony, which bears a close resemblance to a colony formed by human ES cells.

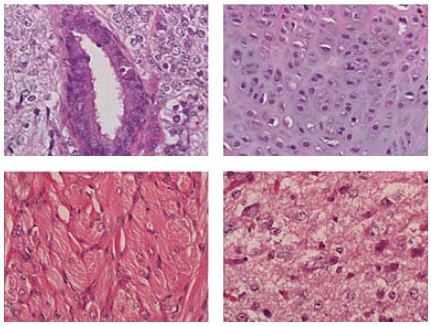
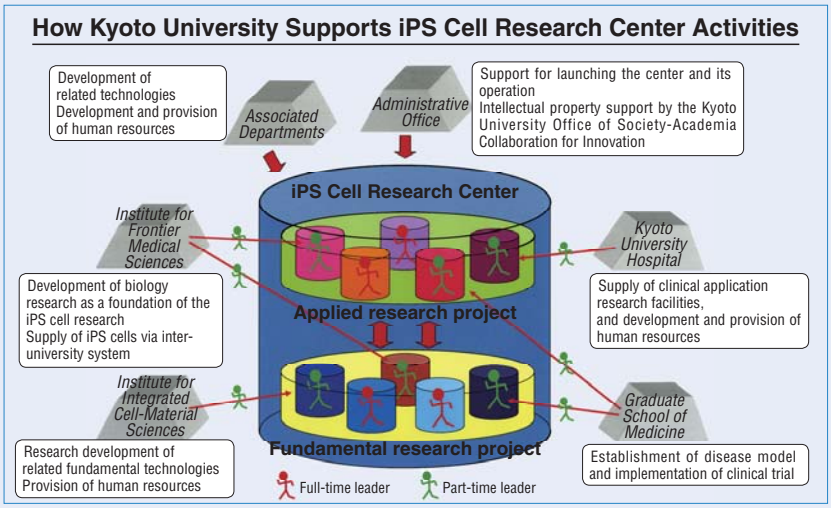


Figure 2. Differentiation potential of human iPS cells
The approximately 5 million human iPS cells transplanted under the skin of an immunosuppressed mouse generated a tumor of about 1 cm in size after two months. A tissue analysis revealed that it was a teratoma, containing various tissues including nerve, skin, muscle, cartilage, intestine tissue, and adipose tissue. (Upper left: intestine tissue; upper right: cartilage; bottom left: muscle; bottom right: nerve tissue)
In another experiment, pulsating cardiac muscle cells were also generated from human iPS cells.

On the 22nd of January 2008, Kyoto University founded a core research institute for promoting iPS cell research in Japan, the iPS Cell Research Center, within the Institute for Integrated Cell-Material Sciences (iCeMS) established under the World Premier International Research Center (WPI) Initiative.

The iPS Cell Research Center will significantly advance the research on the development of fundamental technologies of regenerative medicine by controlling stem cells (e.g. ES cells and iPS cells), which are one of the three major research areas of the iCeMS. Research on clinical applications of iPS cells will be also promoted in collaboration with the Institute for Frontier Medical Sciences and the Graduate School of Medicine.



Jane GOODALL Symposium "Towards a harmonious coexistence in our global society —Perspective of the Wildlife Research Center"

On November 11, 2007, the Jane Goodall Symposium organized by the Primate Research Institute and the Jane Goodall Institute Japan was held with Princess Hisako Takamado in attendance.

Commemorating the conferring of an honorary Kyoto University doctorate on Dr. Goodall, the symposium celebrated the April 2007 opening of the Chimpanzee Sanctuary Uto, which works for chimpanzee welfare and longevity, as well as the launching of the Primate Research Institute's Section of Welfare and Longevity. The event also heralded the upcoming founding of the Wildlife Research Center in 2008.

President Oike and Princess Hisako Takamado listen attentively to Goodall's speech.

Tetsuro Matsuzawa, director of the Primate Research Institute, launched Session One with his speech "Coexistence of four genera of hominidae and the role of zoos." Then, the topics of chimpanzees, gorillas and humans were taken up by Gen'ichi Idani, director of the Great Ape Research Institute, Hayashibara; Profs. Juichi Yamagiwa (Graduate School of Science) and Kozo Matsubayashi (Center for Southeast Asian Studies), respectively. Prof. Emiritus Toshitaka Hidaka brilliantly wrapped up the session with comments on "Why we must understand each animal's culture if we want to understand nature."

Kyoto University President Kazuo Oike opened Session Two saying, "The mission of universities is to educate, study and contribute to society. Deepening learning through research and education is what universities do best, what only we can do. I want Kyoto University to be a place that deepens learning."

Suddenly called on to interpret her speech, Primate Research Institute Director Tetsuro Matsuzawa interacts easily with Dr. Jane Goodall at the podium.

Then, Princess Hisako Takamado, who attended school with Goodall, offered her congratulations, saluting her character and enduring personal magnetism. Dr. Goodall's speech entitled "Forty-eight years with wild chimpanzees" began with a chimpanzee call that transcended language barriers. Goodall's stories about her unique experiences, her passionate descriptions of a variety of environmental preservation activities, and her easy exchanges with Director Matsuzawa, who interpreted for her, enthralled the roughly 300 who packed the hall.

Dr. Jane GOODALL receives an honorary doctorate from Kyoto University

On November 12, 2007, Kyoto University conferred an honorary doctorate on Dr. Jane Goodall, British primatologist and the world's foremost authority on chimpanzees.

Goodall was so honored because of her outstanding contributions to scientific culture, notably the discoveries that animals besides humans use tools and that chimpanzees pass on knowledge, techniques and values that transcend their generations. Moreover, her collaborations with Japanese primatologists have contributed significantly to education and research at Kyoto University.

Following Nobel laureate Dr. Susumu Tonegawa in April 2004, Goodall becomes the 11th person—and the first woman—to receive an honorary doctorate from Kyoto University.

At the press conference and commemorative lecture following the award ceremony, Goodall recalled her own research and collaborative projects with Kyoto University and expressed her hopes; "I treasure this honorary doctorate and connection with Kyoto University and want to work with you to protect our planet. I will continue to deliver lectures around the world and write as long as I am able."

Dr. Jane Goodall receives her honorary doctorate from President Oike.

Special Interview
Dr. Jane GOODALL, D.B.E.

It is widely known that Dr. Goodall conducted long-term research inside the Gombe National Park in Tanzania and revealed the ecology of wild chimpanzees, which had been previously unknown. Through her tenacious observation, she discovered that chimpanzees, which had been regarded as simple vegetarian, had personalities, complex emotions and that they were able to make and use tools at various scenes. She also found that they passed on their knowledge and skills to the next generations through close parent-child relationships. Because these abilities had been considered to be exclusive to humans, this discovery had a great impact on the whole world.

In Japan, the only nation among major developed countries where wild monkeys make their habitats, pioneering research on primates was started primarily by Kyoto University which produced Dr. Kinji Imanishi, the founder of primatology, and Dr. Junichiro Itani, with the country leading the world in the field of primatology. The primatologists of Kyoto University and Dr. Goodall have been working hard through friendly competition and leading the world in the research on primates since they recognized each other for the first time in 1960.

In 1986, Dr. Goodall quit field research to focus on the protection of chimpanzees and conservation of their environment. Today, 73 years-old Dr. Goodall travels all over the world for more than 300 days a year to deliver lectures on conservation and co-existence with all creatures of the planet.

In November 2007, Dr. Goodall visited Kyoto University to receive an honorary doctorate. Despite her minute-to-minute busy schedule, she took time to give an interview for Raku-Yu.

We can change the world if each of us does not lose hope and takes action for the protection of primates' habitats and for conservation of the global environment.

- The primatologists of Kyoto University and you [Dr. Goodall] have known each other for more than 45 years. Are there any particularly impressive memories?

I remember my first meeting with Dr. Junichiro Itani very well. It was 1960, and I had just started my research on chimpanzees in the Gombe National Park. He was the first scientist who visited me there. The researchers of Kyoto University, including Dr. Itani, researched on the society of Japanese macaques in order to seek the evolutionary origin of the human society. A few years before I started my research in Gombe, they had already become interested in gorillas and chimpanzees, which were closer to humans compared with macaques. Dr. Louis Leakey, who was the anthropologist and my instructor, stopped him, but Dr. Itani visited the lakeshore camp by crossing the wave-swirling Lake Tanganyika on a small boat despite the bad weather. Unfortunately, I was not there when Dr. Itani arrived at the camp, because I had set out up the mountain to observe chimpanzees. My mother welcomed him instead, and Dr. Itani mistook her for me and introduced himself to her. This is how we became friends and through our friendship, I came to know Dr. Kinji Imanishi, one of the fathers of primatology.

- Through communication with the primatologists of Kyoto University, have you found any difference between the West and the East in terms of understanding animals?

When I started the research on chimpanzees, how people understood animals was completely different between the West and the East. I think the traditional eastern value, including that of Japan, considers animals and humans to be the same as a living thing and a part of the nature. In this sense, my research method was eastern and similar to that of Dr. Imanishi and Dr. Itani.

- Could you explain how your method was similar to that of the Japanese researchers?

I named every one of the chimpanzees I met, observed their personalities in the same way as I observed humans and kept records. However, my method was not understood in Cambridge University to which I belonged to earn my Ph.D. Other ethologists criticized my method, saying that “only humans have minds and personalities with feelings and it is unscientific to find personalities in chimpanzees. They should be given identification numbers, not names.” I was shocked, but Dr. Imanishi, Dr. Itani and other primatologists of Kyoto University quickly noticed that animals other than humans had personalities and social relationships. They also observed Japanese macaques, their research target, by giving names to each of them. As the research progressed, awareness of the western people gradually changed. While the awareness of the western primatologists became more eastern, western elements were introduced to the Japanese primatological research. Now both values exist together.

- How do you evaluate the research on primates by Kyoto University?

The research on primates by Kyoto University has greatly influenced primatology around the world. With Dr. Imanishi and others being the founders, the research group of Kyoto University studied primates living in various environments in wide areas for a long period of time and achieved great accomplishments. Without their research, we would probably have not reached the present level of recognition concerning great apes. It is very important to conduct long-term research to know the ecology of wild animals. For the first five months of my life in Gombe, I kept observing chimpanzees from morning until evening every day. As a result, I discovered that the chimpanzees caught termites by using tools. In addition, thanks to observation over the years, I came to know that chimpanzees organized a group based on

Jane at Sweetwaters sanctuary, Kenya, with Uruhara. ©Michael Neugebauer

the power relationship and males raised their status by using various methods in it. The long-term research reveals unknown habits of wild animals, and it also gives us the chance to encounter rare happenings. I think the good tradition of the research on primates by Kyoto University has been enduring since Dr. Imanishi's time and it continues to contribute to the development of primatology throughout the world.

- The theme of the lecture delivered this time is "a harmonious coexistence in our global society." This is also the basic philosophy of Kyoto University. Please tell us the importance of this theme.

If "a harmonious coexistence in our global society" did not spread all around the planet, the future of humans would be extremely sad. In 1986, I put an end to the life in Gombe where I lived for more than 30 years with chimpanzees. It was because I attended an international conference on wild animals that year and heard a shocking report about the critical situation of chimpanzees. I decided to do something in order to protect chimpanzees, which were threatened with extinction due to deforestation, poaching, hunting for commercial purposes and food exploitation.

- What have you found since you began to focus on the protection of chimpanzees?

I started traveling all around Africa in order to appeal for the protection of chimpanzees and realized that protection alone did not solve the problem. You cannot think about environmental destruction and overhunting of animals in Africa without considering the poverty of people living there. While Africa suffers from a serious poverty problem, in other parts of the world, there are regions with excess supply of food and goods. If this imbalance is not corrected, the vicious cycle of environmental destruction will not be broken. Since I realized this, I have been insisting through various activities that every one of us should change our lives. The "Roots & Shoots" activity which I have been involved in since 1991 is an example of it. This program offers environmental education to young people ranging from nursery school children to university students. "Roots & Shoots" represents our wish that through this program, hope for the future breaks through various difficulties around the world, just like roots and shoots go through big rocks under the ground or bricks on the land surface in the course of growing up. Groups and people from 98 countries, including Japan, participate in this program at present.

- Please tell us what you expect from Kyoto University, especially the Primate Research Institute.

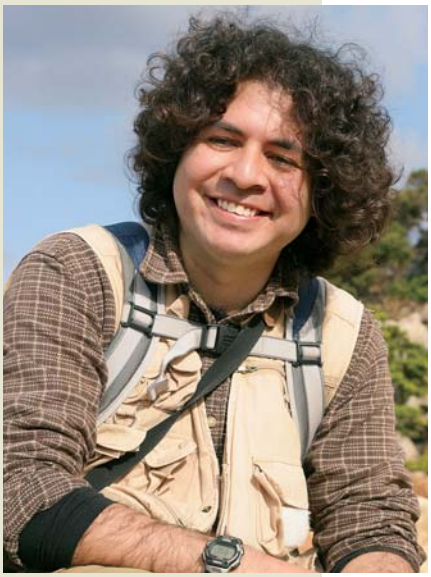
We must try not only to do research but also to protect primates which are rapidly heading for extinction. I truly hope that young researchers go out to the field and conduct research as much as they want. However, in our time, this is not enough. They must do the hard work of protecting primates by standing up against poachers and wood cutting companies. I hope that Kyoto University firmly conducts research, which is their primary duty. In doing so, I expect that the university will develop the power to tackle this hard work, and play a leading role in the conservation of the environment and protection of primates' habitats throughout the world.

■ Profile
Jane Goodall

- Born in 1934
- Field of specialization: Primatology, Ethology
- Earned her Ph.D. in Ethology from Cambridge University
- Awarded Kyoto Prize in 1990
- United Nations Messenger of Peace
- Dame of the British Empire
- Founding Director of Jane Goodall Institute
- Honorary doctorate of Kyoto University

- Lastly, please give advice to young researchers following you.

I hope that not only primatologists but also researchers in any field become aware that their actions will make a difference in the future of humans. The world is full of problems such as war, terrorism, gene manipulation and climate change, which seem to be beyond our ability. What is important is not to despair of this situation but to have hope. If you take action with hope, you can surely change the future. I would like to deliver this message of hope to young people. It would be wonderful if the "Roots & Shoots" activity also develops in Kyoto University. Nothing produces more energy than young people's action.



Alexander D. HERNANDEZ
- Born in 1973
- Field of specialization: Ecology, Evolution, Parasitology
- Ph.D., Rutgers, The State University of New Jersey
- Visiting researcher, Primate Research Institute, Kyoto University
- URL http://www.pri.kyoto-u.ac.jp/shakai-seitai/seitai/alexander/index.html

As parasites respond quickly to environmental changes, studying them over the long term should help us detect any signs of environmental deterioration early, which would be useful to protect not only monkeys, but also the whole eco-system.

It was in his third year at Rutgers University that something happened which served to motivate Dr. Hernandez to study parasites. He was looking for a unique field of study, and upon hearing from his friends about a professor who was studying an unusual field, he visited the office of Prof. Sukhdeo. His research was on the behavior of parasites after they get inside the bodies of hosts, and how they reach their final destinations, such as the liver and heart. Dr. Hernandez was impressed by the fact that creatures so small that they can't be seen with the naked eye were using behavioral strategies to ensure the survival of their next generation, and so decided at once to involve himself in the parasite study. He was interested in the parasites' journey inside their hosts as well as the way they travel in the natural ecosystem to reach their final hosts. Prof. Huffman of the Primate Research Institute at Kyoto University, who had known Prof. Sukhdeo for many years, invited Dr. Hernandez to Japan, saying "monkeys are an interesting subject for parasite research. Why don't you come work with me on them!!" He came to Japan in 2005 and started his study on the Japanese macaque on Yakushima Island.

Yakushima Island is designated as a World Heritage site for its rich vegetation, and is also the southernmost habitat for the Japanese macaque. Dr. Hernandez has been roaming up and down steep hills and valleys since the fall of 2006 searching for monkey troops, in order to collect their excrement and insects they eat. He is studying to find out the number and species of parasites contained in them, as well as their seasonal changes. He is also investigating the relationship between the extent of infection in monkeys and their sex, age, and social rank in the troop. No researcher has ever done a longitudinal study on primate parasites before this, and it is attracting attention as a piece of valuable research that investigates the issue of food and disease in monkeys from a new perspective, as well as focusing on structural and energetic aspects of food webs, which till now has been regarded as unimportant. "Because this research work is something no one has ever done before, it excites me every day. I'd like to keep visiting Yakushima regularly," says Dr. Hernandez with a twinkle in his eyes.

Understanding the ecology of parasites and food webs in Japanese macaque societies

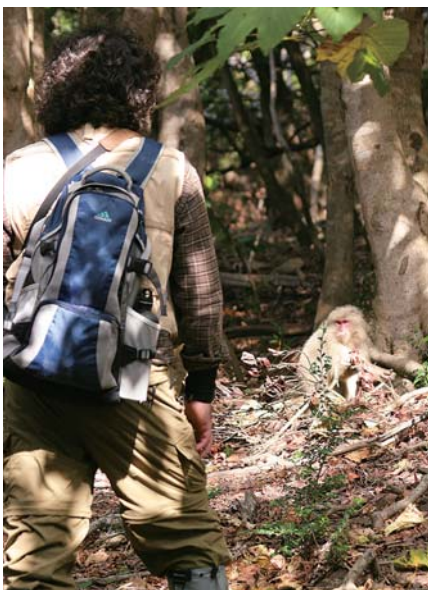
It is estimated that every species on earth is infected with at least one species of parasite. This suggests that at least 50% of all species on earth are parasitic at some point in their life. Parasitic organisms live in, or on, another organism, the host, and depend on the host for growth and reproduction. Yet despite their ubiquity, we have a poor understanding of how parasites affect community structure in nature, and the energy flowing between members of the community linked through feeding interactions.

One way to study communities for general patterns in their structure and how energy flows through their feeding interactions is by constructing and analyzing food webs. Food webs are relatively simple drawings of the interactions that occur between animals in a community, and they have become a corner stone in the field of community ecology 80 years after Charles Elton introduced them into the field at the age of 26 in his seminal book, *Animal Ecology*. Today, food webs help to generate patterns tested for their generality in nature through both empirical and theoretical approaches. For example, one pattern that is presently being debated is whether energy flow and the dynamics of populations in complex communities are more or less stable than in relatively simpler communities. However, until very recently, few food web studies considered the relative importance of parasitism to these patterns. New evidence suggests that this previously neglected group of organisms dominate the number of links that are possible in food webs, and one prediction is that they can have major effects on the stability of communities.

Of course, human societies have known about parasites, or at least the diseases that they can inflict, since antiquity. For example, there are records in Egyptian hieroglyphics of blood in urine, which we now know can be caused by the eggs of parasitic worms living in capillaries around the bladder trying to exit with urine. Once outside, eggs hatch, larval stages infect snails, multiply, and juvenile stages emerge to penetrate human skin in water. Nonetheless, as modern humans increasingly encroach on wildlife habitat, there is growing concern about the threat of infectious diseases emerging from natural areas that remain poorly studied. Thus, it is perhaps not surprising given the close relationship between non-human primates and humans, and the continued human abuse of natural ecosystems that sustain non-human primates, that biologists are trying to better understand the ecology of parasites in this group of organisms.

At Kyoto University's Primate Research Institute, I am testing some early predictions in the fledgling field of primate parasite ecology by studying the ecology of parasites transmitted via the feeding interactions of Japanese macaques on Yakushima Island in southwestern Japan. Japanese macaques have played a key role in understanding the general ecology of non-human primates, especially about social dominance. However, the relation between dominance rank and parasite infections in these monkeys has never been tested, especially because relatively few studies exist on the interaction between parasites and hosts in wild Japanese macaque populations.

Several species of roundworm parasites live as adults in the gastrointestinal tract of Japanese macaques on Yakushima Island. Some of these parasites pass out eggs that are ingested by dung-feeding beetles, and juvenile stages form cysts in muscle until macaques eat infected beetles. Without beetles or macaques feeding on beetles, the parasites' life history cannot be completed. Clearly, parasites are intimately associated to feeding interactions within the Yakushima food web, and this is facilitating testing ideas on the role that parasites play in the structure of and energy flow through the community that macaques are a part of.



International Exchange Program (IEP)

– To open opportunities for young students to experience the world

"What a wonderful experience it was! I hadn't visited any foreign country before. I had never spoken with foreign youths! I got a really valuable experience through this program". This is what we have often heard from students who participated in the IEP

IEP is a program in which junior undergraduate students of Kyoto University visit a foreign partner university and stay there for a short period of time. In exchange students of the partner university visit Kyoto University. Students of both universities learn together in the campuses of the two universities.

The International Center of Kyoto University offers IEP in cooperation with other faculties or research centers. The term of each program is usually from one to two weeks. Professors accompany these students and teach about their specialized area. Students can therefore learn from professors of the two universities and at the same time learn about the people and culture of the host country.

Kyoto University is quite an internationalized university. Every year more than five thousand researchers visit foreign universities and more than three thousand foreign researchers visit us. One thousand three hundred foreign students are studying in this university. Many international symposiums are held on its campus. In spite of these facts young Japanese students tend to be hesitant to go abroad and we sought for ways to encourage students to go abroad. In order to achieve this purpose, we decided to open a special course to let young students experience foreign countries. This was the reason for establishing the IEP.

Three or four courses are opened every year and about fifteen students participate in each course.

China

With Fudan University in China we exchange students yearly. The Faculty of Economics of Kyoto University has its Shanghai Center for Economic Research on the campus of Fudan University. The Kyoto University students participate in lectures in Fudan University. They also visit various places in Shanghai and make field trips to various areas in China.

In exchange, students of Fudan University visit Kyoto University. They attend the lectures of various subjects. They include the history of Kyoto University, its unique Kyoto culture and they visit various science facilities of Kyoto University.

Vietnam

The IEP program offered by the Graduate School of Global Environmental Studies is very unique. GSGES has its research station in Hue and it serves as the base for the IEP. Students visit a village in the nearby mountain area and also a village in the sea shore area. Kyoto University students have presentation meetings about their experiences with the Hue University students. In exchange the Hue University students visited Kyoto University in 2007.

USA

Students visited New York, New Orleans and San Francisco with the professors of the Disaster Prevention Research Institute. In New York they visited Ground Zero. In New Orleans they visited the areas which suffered severely from Hurricane Katrina. They had meetings with the people whose lives were damaged the hurricane and listened to their story of the recovery. Students learned the importance to prevent disaster and how to design an effective recovery plan.

IEP opens the door for students to understand different cultures. One Chinese student, who participated in the program, wrote in his web site. "Before I visited Kyoto, I had a bad image of the Japanese people. However, after I visited Kyoto and spoke with the Kyoto University students, my perception has changed dramatically. I like Japan very much."

The university has to pay attention to the safety of students, when it plans to send out students. The risk management of the IEP courses is very important. The International Center prepares each program with accompanying faculty members and tries to reduce any risks involved.

IEP started three years ago and in the meantime we have accumulated good experiences. IEP is a very effective course to enhance the possibility that young students experience the world.

Students tested the water quality in Kunming University of Science and Technology

Fudan University students visited Daigoji Temple in Kyoto

Students heard the story of residents in Hon Hah Village in Vietnam

Association of East Asian Research Universities (AEARU) 13th Annual General Meeting and 21st Board of Directors Meeting held at Kyoto University

The Association of East Asian Research Universities (AEARU) is an alliance of the foremost research universities in the East Asian Region. The association includes member universities from Japan, the Chinese mainland, Korea, Taiwan and Hong Kong. Kyoto University president Dr. Kazuo OIKE currently holds the position of chairperson of AEARU (the president's two-year term as chairperson began in January 2008), and Kyoto University is actively engaged in promoting and advancing academic exchange between the member universities.

On August 21st~22nd, 2007 the presidents of AEARU member universities were invited to Kyoto University for the association's 13th Annual General Meeting and 21st Board of Directors Meeting. The general meeting was attended by representatives from 14 member universities, and discussions were held covering various topics, including reports of recent AEARU activities (such as workshops, symposia and summer camps), plans for activities and events in the coming year, and the possibility of expanding the association's membership.

In the afternoon, following the general meeting, a presentation session was held in which representatives from each member university delivered reports of their institution's recent achievements or outlined future plans. President Oike gave a presentation outlining new initiatives being taken by Kyoto University to promote international student exchange.

Following the presentation session, attendees were treated to a lecture by Prof. Bunkyo KIN, Director of Kyoto University's Institute for Research in Humanities. Prof. Kin's lecture was entitled "The Contemporary Significance of Kanji Use in East Asia." After his lecture Prof. Kin lead the attendees on a guided tour of the Institute for Research in Humanities' Documentation and Information Center for Chinese Studies, an ornate and unusual building containing many rare volumes of Chinese texts.

Kyoto University-University of California, Davis Administrative Staff Internship Exchange Program

In June of 2005, Kyoto University concluded an administrative staff internship exchange agreement with the University of California, Davis. The agreement enables administrative staff members from the two institutions to broaden their range of experience by spending a period of up to three months stationed in an appropriate department of the partner institution. The institutions also benefit from the exchange of information and ideas that occurs when either hosting or sending a staff member.

From October 19th to November 30th, 2007, Kyoto University's International Affairs Division hosted Ms. Kristy Hirokawa, the first intern to be sent from the University of California, Davis. Kristy is the Executive Assistant to the Vice Provost for University Outreach and International Programs at U.C.,Davis. During her internship, Kristy visited many of Kyoto University's facilities, conducted interviews with staff members, and gave a presentation about administrative practices at her institution.

The following is Kristy's own account of her internship experience.

In 2005, Kyoto University and the University of California, Davis established an agreement allowing for the exchange of mid-career international programs staff members on an annual alternating basis. In 2007 I was honored to be selected as the first UC Davis participant in this exciting and innovative career development opportunity.

My six week internship in Kyoto University's International Affairs Division began in mid-October. From the moment I arrived, I was in awe of the natural beauty surrounding Kyoto City, the kindness of seemingly everyone I encountered, and the bold juxtaposition of the historic and traditional with the modern and cutting edge. Working for such a prestigious, revered higher education institution as Kyoto University was eye-opening and inspiring. It is an especially wonderful and exciting time to be at Kyoto University as it continues to transition from its former status as a national university to a semi-privatized corporation. Prior to my internship, I did not realize the extent of the vast systematic and administrative changes taking place. Kyoto University is at a crucial crossroad in its existence facing many new challenges and issues everyday.

I had the unique opportunity to not only watch history unfolding and being created, but to experience it first hand.

When I left the US, my goal was to gain a broad understanding of Japanese culture, higher education in Japan, and Kyoto University's administrative structure, personnel system and international programs. By the time I returned to the US, I had not only achieved these goals but I had also received a renewed passion for the importance of internationalizing UC Davis' campus and gained a better understanding of the work my home office does for our university and my role within our office.

This internship was a significant experience in my career and life. I am truly grateful to Kyoto University's International Affairs Division and UC Davis' Office of University Outreach and International Programs for making it possible. It is my hope that this exchange program will continue for many years to come and that the connection between our two universities will continue to strengthen and grow.

The 3rd University Administrators Workshop

The third in Kyoto University's series of workshops for administrative staff from leading Asian universities was held in KU's Clock Tower International Conference Hall on January 24th~25th. The theme of the workshop was "Laying Firm Foundations for University Internationalization." Administrative staff in charge of international affairs and student exchange from sixteen universities throughout Asia and eight Japanese universities attended the event, as well as keynote speakers from Australia and the United States. The participants gave presentations and exchanged opinions on current and emerging issues in university international exchange and affairs.

The workshop began with a welcome address by Vice-President Toshio Yokoyama, director-general of KU's Organization for the Promotion of International Relations, which was followed by keynote speeches by Ms. Elizabeth A Bare, Vice-Principal and Head of University Services of the University of Melbourne who spoke about internationalization in Australian universities from a staffing perspective, and Dr. Pricilla Stone, Director in charge of Overseas and Undergraduate Programs at Washington University, St. Louis, who discussed current trends in study abroad programs in the United States.

The afternoon of the first day was occupied by two concurrent presentation and discussion sessions on the themes of "Networking to Promote Student Exchange" and "Advancing Campus Internationalization." These sessions comprised of short presentations by representatives from each of the attending institutions, followed by a lively round of questions and discussion on the issues raised.

The proceedings of concurrent sessions were reported and discussed further at a combined session the following morning. It is hoped that this opportunity for the people directly involved with the practical aspects of university internationalization to exchange opinions and ideas will help improve the quality of international activities at the participating universities, as well as enhance relations between Japanese universities and the leading universities of other Asian countries.

Participating Universities:
Chulalongkorn University, Fudan University, Hitotsubashi University, The Hong Kong University of Science & Technology, Hue University, Kasetsart University, Keio University, Nagoya University, Nanjing University, National University of Singapore, Osaka University, Peking University, Pohang University of Science and Technology, Ritsumeikan University, Seoul National University, Tohoku University, Tokyo Institute of Technology, Tsing Hua University (Hsinchu), Tsinghua University (Beijing), University of Indonesia, University of Malaya, University of the Philippines, Diliman, University of Tokyo, Wuhan University

Session

Ms. Elizabeth A Bare, Vice-Principal and Head of University Services, the University of Melbourne

Dr. Priscilla Stone, Director, Overseas and Undergraduate Programs, Washington University in St. Louis

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PROMENADE 京都逍遥

Tadasu no Mori— a forest where the memories of the culture of the Heian Period remain

There is a forest of about 124,000 m² where the Kamo River joins the Takano River, approximately one kilometer west of Kyoto University's Yoshida Campus. It is Tadasu no Mori located on the grounds of Shimogamo Shrine. It used to be a vast forest of about 4,950,000 m², but it decreased to the present size due to the medieval wars and seizure by the Meiji government. It is said that the name "Tadasu", which means "to investigate", was given to this forest because judicial trials were held in this forest a long time ago. However, despite such origin, the seasonal beauty of this forest is so spectacular that it was portrayed in various poems and stories such as "Genji Monogatari [The Tale of Genji]" and "Makura no Soshi [The Pillow Book]." Especially in the spring when cherry, mallow, quince and hydrangea blossoms bloom, these blossoms make a great contrast with the fresh green leaves. Many events are held in this season, including the Yabusame (horseback archery), the Mikage Festival and the Aoi Festival.

Today in Tadasu no Mori, there are nearly 40 species of trees. And there are about 5,000 trees, of which 600 are 200 to 600 years old. It still has the same vegetation as the original forest in the second to third century B.C. It was designated as a national historic site in 1983 as a scientifically valuable forest, and it was also registered as a World Heritage site in 1994 together with Shimogamo Shrine.

Detailed academic research has been conducted mainly by Prof. Emeritus Tsunahide Shidei at Kyoto University and an authority in forest ecology. This research is still ongoing. Furthermore, lectures on the plants in this forest have been given to the general public at the annual tree-planting ceremony held on April 29. These activities are now passed on to the students of Prof. Shidei, and they help the conservation of the forest by increasing people's interest in Tadasu no Mori, which serves as a recreation area for citizens.

The Yabusame (horseback archery) performed on May 3. Based on a tradition of the Heian period, a wonderful feat is performed by humans and horses together, in which the archers in costumes of court nobles successively shoot arrows at the targets while riding horses.

Riding ground in the west of the approach to the Shrine in the season of fresh leaves.
This is where the Yabusame Shinto service is performed.

Tadasu no Mori is a forest of deciduous trees. It also offers wonderful scenery in the autumn when leaves change colors.

A shinto ritual in which Saiodai of the Aoi Festival and others purify themselves in the Mitarashi River in the grounds of the Shrine in early May (please also see Raku-Yu Vol.11) The contrast between the vivid twelve-layered ceremonial costume and green leaves is refreshing.

Mountain cherry blossoms make a beautiful contrast with the vermilion-lacquered two-story gate in April.